CLAIMS

1. A feed-forward linear amplifier controlled by spurious ratio comprising:

a feed-forward linear amplifier having a first monitoring point coupled to a first loop, and a second monitoring point coupled to the feed-forward linear amplifier output; and

a control system having a first input coupled to the first monitoring point, a second input coupled to the second monitoring point, a third input coupled to a source of frequency information, and a control output coupled to a control input of the feed-forward linear amplifier.

2. The spurious ratio controlled feed-forward linear amplifier of claim 1, in which the source of frequency information is provided from a bank of synthesizers coupled to the cross-coupled linear amplifier by a control bus.

3. The spurious ratio controlled feed-forward linear amplifier of claim 3, in which the control bus is a RS232 bus.

4. The spurious ratio controlled feed-forward linear amplifier of claim 3, in which the control bus is an RS485 bus.

5. The spurious ratio controlled feed-forward linear amplifier of claim 3, in which the control bus is a TCP/IP bus.

6. The spurious ratio controlled feed-forward linear amplifier of claim 3, in which the control bus is an I2C bus.

7. The spurious ratio controlled feed-forward linear amplifier of claim 1, in which the source of frequency information is an input signal preset.

8. The spurious ratio controlled feed-forward linear amplifier of claim 1, in which the source of frequency information is a scanning circuit coupled to the feed-forward linear amplifier input.

9. The spurious ratio controlled feed-forward linear amplifier of claim 1, in which the first monitoring point coupled to the first loop is coupled at an output of the main amplifier of the feed-forward linear amplifier.

10. The spurious ratio controlled feed-forward linear amplifier of claim 1, in which the first monitoring point coupled to the first loop is coupled at an output of the signal-cancellation loop of the feed-forward linear amplifier.

11. The spurious ratio controlled feed-forward linear amplifier of claim 1, in which the control input of the feed-forward linear amplifier is coupled to a gain control circuit.

12. The spurious ratio controlled feed-forward linear amplifier of claim 1, in which the control input of the feed-forward linear amplifier is coupled to a phase control circuit. The spurious ratio controlled feed-forward linear amplifier of claim 1, in which the control input of the feed-forward linear amplifier is coupled to a phase and gain control circuit.

13. The spurious ratio feed-forward amplifier of claim 1, in which the spurious detection circuit further includes a vector modulator, using Cartesian components.

14. The spurious ratio controlled feed-forward linear amplifier of claim 13, in which the phase and gain control circuit is coupled to the error amplifier input.

15. The spurious ratio controlled feed-forward linear amplifier of claim 1, in which control system further comprises:

a first receiver coupled to the first monitoring point

a second receiver coupled to the second monitoring point;

a ratio detector having a first ratio detector input coupled to a first receiver output, a second ratio detector input coupled to a second receiver output, and a ratio

detector output coupled via the controller to the control output.

16. The spurious ratio controlled feed-forward linear amplifier of claim 15, in which the first receiver further comprises:

a mixer having a first mixer input coupled to the first monitoring point;

a band pass filter having a first band pass filter input coupled to a mixer output; and

a local oscillator having an output coupled to a mixer second input and the output controlled by a control signal coupled to the source of frequency information.

17. A spurious ratio controlled feed-forward amplifier comprising:

a signal source producing a multi-carrier input signal;

an input sampling coupler having an input coupled to an output of the signal source;

a first phase and gain adjusting circuit having an input terminal coupled to an output of the input sampling coupler;

a main amplifying device having an input terminal coupled to an output of the phase and gain adjusting circuit and an output terminal at which an amplified signal is provided,

wherein the amplified signal comprises an amplified input signal component and a spurious signal component;

a distortion sampling coupler having an input coupled to the output terminal of the main amplifier;

a first delay line having an input port coupled to an output port of the input sampling coupler;

a first monitoring coupler having an input coupled to an output of the summing coupler and a coupled port forming a first monitoring point;

a summing coupler having an input coupled to an output of the first delay line, and an input port coupled to a forward port of the distortion sampling coupler;

a second delay line having an input coupled to a distortion sampling coupler output, and providing delay to the amplified signal to produce an inverted amplified signal at a second delay line output;

a second monitoring coupler having an input coupled to an output of the error signal injection coupler;

a second phase and gain adjusting circuit having an input coupled to an output of the first monitoring coupler;

an error amplifier having an input coupled to an output of the second phase and gain adjusting circuit, and an error amplifier output coupled to a coupled port of the error signal injection coupler;

a control system having a first input coupled to the first monitoring point, a second input coupled to the second monitoring point, a third input coupled to a frequency information output of the signal source, and a control output coupled to a control input of the second gain and phase adjusting circuit.

18. The feed-forward amplifier according to claim 17, wherein the spurious signal component includes an inter-modulation product of the multi-carrier input signal.

19. The feed-forward amplifier according to claim 17, wherein the spurious signal component includes noise generated by the main amplifier.

20. The feed-forward amplifier according to claim 17, wherein the control system further comprises:

a first narrowband receiver coupled to the first monitoring point for capturing the spurious component of the amplified input signal; and

a second narrowband receiver coupled to the second monitoring point for capturing the spurious component of the amplified input signal.

21. The feed-forward amplifier according to claim 20, wherein the control system further comprises a ratio detector

having a first ratio detector input coupled to a first narrowband receiver output, and a second ratio detector output coupled to a second narrowband receiver output, for detecting the ratio of the spurious component of the output signal and the spurious component of the amplified input signal.

22. The feed-forward amplifier according to claim 17, further comprising a pre-distortion circuit coupled between the first gain and phase adjusting circuit and the main amplifying device.

23. A method of adjusting a spurious ratio controlled feed-forward linear amplifier the method comprising:

monitoring a first spurious component at a first monitoring point by a control system;

monitoring a second spurious component at a second monitoring point by the control system;

comparing the second spurious component to the first spurious component to form a ratio; and

adjusting the feed-forward linear amplifier through a control output of the control system;

whereby the ratio of the second spurious component to the first spurious component is minimized.

24. The method of claim 23, further comprising the step of adjusting an auxiliary amplifying device in the feed-forward linear amplifier through the control output of the control system.

25. The method of claim 23, further comprising the step of adjusting phase and gain in the feed-forward linear amplifier through the control output of the control system.

26. The method of claim 23, further comprising the step of pre-distorting an input signal.

27. The method of claim 23, in which the first spurious component is coupled from a first monitoring point in the error cancellation loop.

28. The method of claim 23, in which the first spurious component is coupled from a first monitoring point in the error cancellation loop prior to the second phase and gain adjusting circuit.

29. The method of claim 23, in which the second spurious component is coupled from a second monitoring point at the spurious ratio controlled feed-forward amplifier output.

30. The method of claim 23, in which adjusting the feed-forward linear amplifier is achieved by applying the

control output of the control system to a phase and gain adjusting circuit disposed in an error cancellation loop.

31. A method of adjusting a spurious ratio controlled feed-forward linear amplifier the method comprising:

monitoring a first spurious component at a first monitoring point, coupled to a main amplifier input, by a control system;

monitoring a second spurious component at a second monitoring point, coupled to an error loop, by the control system;

monitoring a third spurious component at a third monitoring point, coupled to a spurious ratio controlled feed-forward linear amplifier output, by the control system;

comparing the second spurious component to the third spurious component to form an error loop ratio;

comparing the first spurious component to the third spurious component to form a pre-distorter ratio; and

adjusting a phase and gain adjusting circuit disposed in the error loop of the feed-forward linear amplifier through a control output of the control system in response to the error loop ratio;

adjusting a pre-distorter circuit disposed in the signal cancellation loop of the feed-forward linear amplifier

through a control output of the control system in response to the pre-distorter ratio;

whereby a spurious component in an output of the spurious ratio controlled feed-forward linear amplifier is minimized.

32. The method of claim 31, in which the second monitoring point coupled to the error loop, is coupled prior to a phase and gain adjusting circuit disposed in the error loop.

33. A method of adjusting a spurious ratio controlled feed-forward linear amplifier having a first monitoring point coupled to a first loop, and a second monitoring point coupled to the feed-forward linear amplifier output, and a control system having a first input coupled to the first monitoring point, a second input coupled to the second monitoring point, a third input coupled to a source of frequency information, and a control output coupled to a control input of the feed-forward linear amplifier, the method comprising:

monitoring a first spurious component at the first monitoring point by the control circuit;

monitoring a second spurious component at the second monitoring point by the control circuit;

comparing the spurious component of the second spurious component to the first spurious component in the control circuit to form a ratio; and

adjusting the control output of the control system of the feed-forward linear amplifier so that the ratio of the spurious component of the second spurious component to the first spurious component is minimized.